

REMARKS

Claims 46-65 are presently pending in this application. Claims 46-51 stand as originally filed without any amendments, and claims 52-65 were added to the application in the response dated March 15, 2004. None of the pending claims in the application have been amended.

In the Office Action dated June 2, 2004, the pending claims were rejected as follows:

(A) Claim 46 was rejected under 35 U.S.C. § 102 over U.S. Patent No. 4,946,550 issued to Van Laarhoven ("Van Laarhoven");

(B) Claims 47 and 51 were rejected under 35 U.S.C. § 103 over Van Laarhoven;

(C) Claims 52 and 53 were rejected under 35 U.S.C. § 102(b) over U.S. Patent No. 4,145,703 issued to Blanchard et al. ("Blanchard");

(D) Claims 54 and 58 were rejected under 35 U.S.C. § 103 over Blanchard;

(E) Claims 59-65 were rejected under 35 U.S.C. § 103 over the combination of U.S. Patent No. 5,433,651 issued to Lustig et al. ("Lustig") and U.S. Patent No. 4,755,058 issued to Shaffer ("Shaffer").

A. Response to Section 102 Rejection of Claim 46 (Van Laarhoven)

Claim 46 was rejected under 35 U.S.C. § 102(b) over Van Laarhoven. In rejecting this claim, the Examiner admits that Van Laarhoven "does not disclose the color or transparency of the resist." In an attempt to overcome this admitted shortcoming of Van Laarhoven, the Examiner asserts that "those in the art could choose any known and available resist for the resist in such a structure." This assertion by the Examiner is not only incorrect, but it also does not comport with the standard of anticipation under 35 U.S.C. § 102. Therefore, for the reasons explained below, claim 46 is not anticipated by Van Laarhoven.

Claim 46 is directed to a microelectronic substrate assembly having a first layer of a first material with a first color, a second layer of a second material with a second color over the first layer, and a sacrificial marker layer of a third material having a third color optically distinct from the first and second colors of the first and second materials. The sacrificial marker layer marks a location in the film stack on the microelectronic substrate assembly. The sacrificial marker layer provides a significant advantage for endpointing CMP processes because the material of the sacrificial marker layer does not need to be used in the operation of the circuitry such that it can be selected primarily based on its distinctive color as opposed to its conductive, dielectric, heat transfer, chemical or other physical properties.

The Examiner incorrectly applies the standard of anticipation under 35 U.S.C. § 102 in rejecting claim 46 over Van Laarhoven. To support a rejection under Section 102, the applied reference must disclose each and every feature set forth in the claims. The Examiner does not follow this standard and even admits that Van Laarhoven fails to disclose or suggest at least one feature of claim 46 (e.g., the color or transparency of its resist layer). Instead, the Examiner promulgates a new standard in which any claimed features not disclosed in an applied reference are in effect read into the reference on the bare assertion that a person skilled in the art could possibly choose any known and available structure of the missing element even though the combination of the claimed features is not suggested or disclosed in the applied reference. This simply is not the standard of anticipation under Section 102. Therefore, the proper standard for determining whether Van Laarhoven anticipates claim 46 is whether Van Laarhoven discloses the combination of all of the features recited in claim 46 without the benefit of wrongly asserting that a person could choose any known and available photoresist material.

Claim 46 is patentable over Van Laarhoven under Section 102 because this reference fails to disclose several features of this claim. For example, Van Laarhoven fails to disclose or suggest a marker layer on the substrate. As set forth in the present application, the marker layer is used to identify an elevation within the film stack on the

substrate. The marker layer actually "marks" a physical location on and/or in the substrate. The marker layer can also be "sacrificed" such that its intended purpose is to be removed from most of the wafer instead of performing an electrical function in the operation of the circuit. The photoresist in Van Laarhoven does not mark a level in the film stack of the substrate for subsequent processing. Moreover, as admitted by the Examiner, Van Laarhoven does not disclose the color or transparency of its resist. Van Laarhoven accordingly fails to disclose or suggest several features set forth in claim 46. Therefore, the rejection of claim 46 under Section 102 over Van Laarhoven should be withdrawn.

The Examiner's comments on the applicant's remarks in the Response dated March 15, 2004, are inaccurate and miss the point of the applicant's arguments. More specifically, the Examiner appears to assert that selecting a material based on its suitability for photolithographic processes rather than its color does not preclude the material from being optically distinguishable from the underlying layer. The Examiner further takes the position that "any such structure in which the resist is in fact actually a different color than the underlying layers will meet claim 46 no matter what criteria may have been used for choosing the resist." Even if this position taken by the Examiner is correct, which the applicant does not concede, Van Laarhoven does not disclose that its resist is a different color than the underlying layers nor does the Examiner cite any reference disclosing a resist having a different color than the underlying layers. Another factor weighing against the Examiner's position is that resists are typically clear, transparent liquids that are deposited onto a wafer. The Examiner has accordingly failed to carry the burden of showing that Van Laarhoven discloses each and every element set forth in claim 46.

Claim 46 is also patentable over Van Laarhoven under Section 103 because a person skilled in the art would not be motivated to mark a portion of the film stack with a sacrificial marker layer having an optically distinct color from either silicon nitride or silicon dioxide based on the prior art. The only motivation to use a sacrificial marker layer that is optically distinct from the underlying layers comes from the application

because the resist layer disclosed in Van Laarhoven is not used as a marker and it is not described as being optically distinguishable from the underlying layers. Because Van Laarhoven does not state anything with respect to marking an elevation on the wafer or to the optical properties of its resist layer, a person skilled in the art would evaluate whether the material (a) is chemically compatible with the other materials in the substrate, (b) provides sufficient coverage, (c) has the proper chemistry for the development/wash process, and (d) has the desired properties for the exposure process for use in photolithographic processes. A person skilled in the art would not use the resist in Van Laarhoven to be a marker layer or to be optically distinguishable from the underlying layers because this would require further research to find such a photoresist or to make a custom resist. Such additional steps would require motivation that is not provided by Van Laarhoven. Therefore, claim 46 is also patentable over Van Laarhoven under Section 103.

B. Response to Section 103 Rejection of Claims 47-51 (Van Laarhoven)

Claims 47-51 are patentable over Van Laarhoven because this reference fails to disclose all of the features of these claims for the reasons discussed above with respect to claim 46. Claims 49-51 are further patentable over Van Laarhoven because this reference completely fails to disclose or suggest selecting a resist that is either red, black or white. It will be appreciated that selecting a sacrificial layer to have such colors may require a unique or custom material with the appropriate pigment. Clearly, a person skilled in the art would not be motivated to find such a material or have it manufactured based on Van Laarhoven. Therefore, claims 47-51 are further patentable over Van Laarhoven under Section 103.

C. Response to Section 102 Rejection of Claims 52 and 53 (Blanchard)

Claims 52 and 53 were rejected under 35 U.S.C. § 102 over Blanchard. In making this rejection, the Examiner states that Blanchard discloses a first layer 25A of silicon nitride, a second layer 28A of silicon dioxide, and a third layer 26A of polysilicon between the first and second layers 25A and 28A. The Examiner indicates that the silicon nitride, silicon dioxide and polysilicon layers inherently have in different colors

because they are made from different materials. The Examiner then goes on to state that the instant disclosure and claims do not present the choice of resist as in any way critical to the structure such that any multi-layer structure anticipates claim 52.

Claim 52 is patentable over Blanchard under Sections 102 and 103 because this reference fails to disclose or suggest several features of this claim. For example, Blanchard fails to disclose or suggest a "sacrificial marker layer" of a third material between a first layer and a second layer that has a color optically distinct from the first and second layers. The sacrificial marker layer (a) marks a feature of the substrate for other processes and (b) is inherently meant to be at least partially removed such that it is "sacrificial." The polysilicon 26A is a conductive member in the structure illustrated in Blanchard, and thus it does not mark a location feature on the substrate for further processing and it is not meant to be sacrificed. Therefore, claim 52 is patentable over Blanchard under Section 102.

Claim 52 is further patentable over Blanchard under Section 103 because the prior art teaches away from removing the conductive polysilicon 26A in the transistors shown in Blanchard. The polysilicon 26A is a conductive line that operates the transistor in Blanchard. Clearly, removing any portion of the polysilicon layer 26A would degrade the conductive line. Therefore, it is incorrect to characterize the polysilicon layer 26A in Blanchard as a sacrificial marker layer that marks an endpoint or other location in the film stack for subsequent processing. Claim 46 is accordingly patentable over Blanchard under Section 103.

Claim 53 is patentable over Blanchard as depending from claim 52 and because it further indicates that the sacrificial layer is on the first layer and the second layer is on the sacrificial layer. Therefore, the rejection of claims 52 and 53 over Blanchard under Section 102 is incorrect and should be withdrawn.

D. Response to Section 103 Rejection of Claims 54-58 (Blanchard)

Claims 54-58 are patentable over Blanchard for the reasons set forth above with respect to claim 52 and also because these claims recite additional features. For

example, claim 54 further recites that the sacrificial layer is an opaque material, and it is not clear whether this is disclosed in Blanchard. Additionally, claims 56-58 disclose that the sacrificial layer is red, black or white, respectively, and this is not disclosed in Blanchard. Therefore, claims 54-58 are further patentable over Blanchard.

E. Response to Section 103 Rejection of Claims 59-65 (Lustig and Shaffer)

Claims 59-65 were rejected over the combination of Lustig and Shaffer on the grounds that Lustig discloses controlling a planarization process that directs light onto the workpiece and that Shaffer discloses providing a plurality of different wave lengths in a reflectance measurement. The Examiner then asserts that it would have been obvious to use a plurality of different wave lengths with the device taught in Lustig to better discriminate the difference between the layers as they become exposed through processing.

Claims 59-65 are patentable over the combination of Lustig and Shaffer because, even assuming for the sake of argument that Shaffer can be properly combined with Lustig as proposed by the Examiner, this combination of references fails to disclose or suggest several features of these claims. For example, these references fail to disclose or suggest providing a microelectronic workpiece including a first layer of material having a first color, a second layer of material having a second color, and a sacrificial marker layer of a third material having a third color optically distinct from the first and second colors. As such, these references completely fail to disclose or suggest the claimed subject matter. Moreover, claims 60-62 further include indicating the intensity of the wavelength of light corresponding to the third color of the sacrificial marker layer. Because Lustig and Shaffer have completely failed to disclose using a sacrificial marker layer for controlling planarization processes, it follows that these references further fail to disclose or suggest determining the intensity of reflected light corresponding to the third color of the sacrificial marker layer. Therefore, claims 59-65 are patentable under Section 103 over the combination of Lustig and Shaffer.

RESPONSE UNDER 37 C.F.R. § 1.116

EXPEDITED PROCEDURE – Art Unit 2877

Attorney Docket No. 108298522US1


Disclosure No. 99-1354.01/US

F. Conclusion

In view of the foregoing, the pending claims in the application comply with the requirements of 35 U.S.C. § 112 and are patentable over the applied art. The applicant respectfully requests reconsideration of the application and a Notice of Allowance. If the Examiner has any questions or believes a telephone conference would expedite prosecution of this application, the Examiner is encouraged to call the undersigned at (206) 359-3258.

Respectfully submitted,
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Date: September 2, 2004



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